

REMARKS

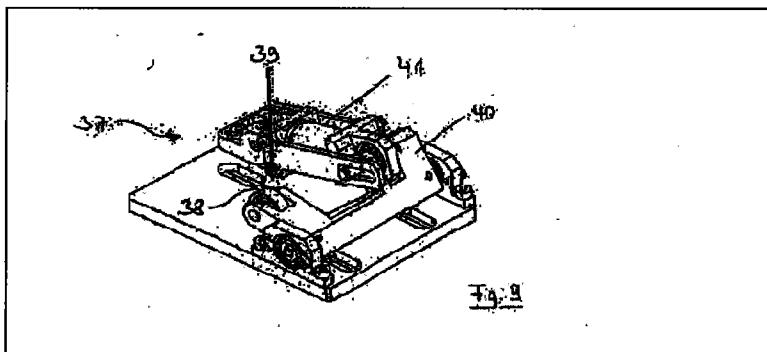
Claims 23-47 are pending. By this Amendment, claims 24, 26 and 46 are cancelled, claim 23 is amended and no new claims are added.

Interview Summary

Applicants thank Examiner Crandall and SPE Johnson for their time and courtesy during the telephone interview of December 21, 2010. Proposed amendments to claim 23 and a proposed amendment to the drawings were discussed. Agreement was not reached. During the interview the Examiners questioned whether there was support in the application for the amended claims. Applicants' representative took the position that the amended claims are fully supported as further discussed below.

Drawings

The Office Action objected to the drawings under 37 C.F.R. 1.83(a). The Office Action indicated that the holding element and stop of claim 26 must be shown in the drawings or the features canceled from the claims. Applicants respectfully traverse the objection.



First, applicants traverse because the claimed stop is depicted in Fig. 9 of the application, as filed, depicting an example weight balancing mechanism that is part of the invention. Reference to Fig. 9 clearly shows that structures depicted in Fig. 9 include the claimed stop.

According to the specification as originally filed, the weight of arm 24 and support 26 exceeds the claimed “limit value of force” that presses downward in the direction of incidence of the laser beam at the limit value of force. The direction of incidence of the laser beam is also the direction toward the eye. A partial counter balancing force provided by the example structure depicted in Fig. 9 is also depicted schematically in Figs. 4 and 5 as suspension 27 (depicted as a spring that supports arm 24 and support 26) which partially counters the weight of arm 24 and support 26 except for the limiting value of force which is allowed to press toward the eye and against the stop. Thus, suspension 27 partially counter balances the weight of arm 24 and support 26. Referring to Figs. 6 and 7, in another example embodiment, negative pressure drive 28 acts, in part, to partially counter balance the downward force created by the weight of arm 24 and support 26.

Paragraph 0075 of the application as published recites:

Fig. 9 shows a possible design of a spring mechanism serving the function of the suspension 27. It is a supporting mechanism 37 which supports the arm 24 from below. The arm 24 is supported on a roll 38 which is connected to a spring 41 via a lever 40, said spring pushing the roll 38 upwards. The weight force of the arm 24 acting in the direction of the arrow 39 can be compensated for as desired, except for a residual bearing load, by suitably selecting or positioning the spring 41.

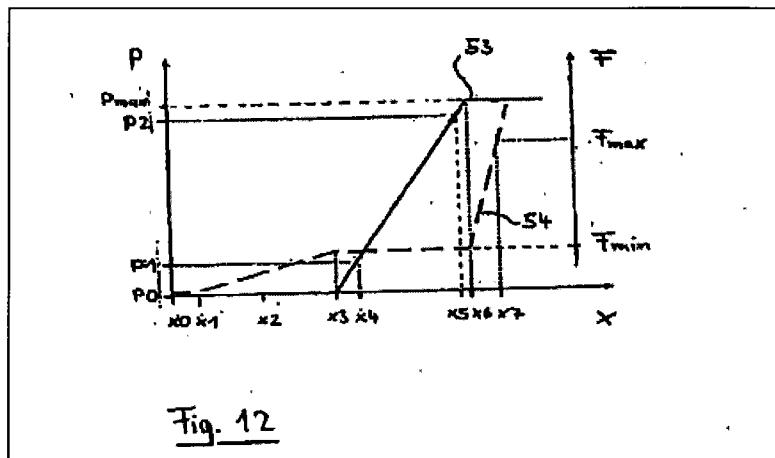
The stated “residual bearing load” refers to the downward directed limit value of force. According to the description of the example embodiment depicted in Fig. 9, arm 24 is supported on roll 38. The downward force created by the weight of arm 24 is depicted as a downwardly pointed arrow annotated 39. It is readily apparent from Fig. 9 that the downward force represented by arrow 39 pressing downward will cause one of two events to occur when the downward force is greater than the upward biasing force from spring 41. Either the downward force will cause roll 38 to be pressed downwardly against the horizontal plate depicted in Fig. 9 or the pin which rides in the slot attached to spring 41 and that is coupled to lever 40 will contact the end of the slot. In either case contact between the depicted parts creates the claimed stop against the downward force represented by arrow 39.

As explained in detail throughout the application as originally filed, spring 41 or suspension 27 partially counter balances the weight of arm 24 and support 26, but does not provide a full counter balance for the weight force, thus, leaving the claimed predefined limit value of the force applied in the direction of incidence of the laser beam, toward the eye. Thus, either the end of the slot in which the pin travels or the plate that roll 38 contacts is depicted as the claimed stop. According to the stop is already depicted in Fig. 9 and no new matter is introduced.

Second. Applicants respectfully traverse the objection because the action of the claimed stop is clearly graphically represented in Fig. 12. Referring to paragraph 0080, “Fig. 12 schematically shows an exemplary relationship between the position P of the arm 24 or of the nozzle 10, respectively, of the laser surgical treatment station 1 and the force F on the eye of the

patient, each as a function of the eye's position X , which is given for a patient lying on the bed 2 by the position of the height adjustment unit 5."

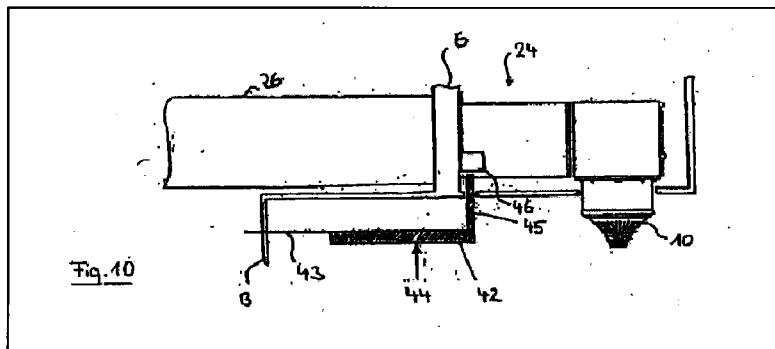
Referring to paragraphs 80-83 of the application as published, "[a]t the same time the nozzle 10 is located at its lowermost position P_0 because the arm 24 contacts the extension 6 at the lower stop." Paragraph 81 recites "however, since this force is still weaker than the force F_{min} by which the arm 24 is raised, the arm 24 continues to rest in this case." Paragraph 82 recites "the eye presses against the contact glass 23 with a force below the minimum force F_{min} , so that the arm 24 still remains in the position P_0 , i.e., is not raised."



According to the claimed invention, the contact glass presses downward on the eye and the eye presses upward on the contact glass with a force represented by a dashed line starting at the origin (x_0, P_0) . As can be seen by reference to the graph depicted in Fig. 12, the position P_0 (represented by a solid line) is maintained until the force F_{min} pressing upward against the contact glass is reached at x_3 . At this point the solid line rises rapidly to the right representing upward movement of the contact glass when the force F_{min} is exceeded by upward force of the eye. The contact glass remains at position P_0 until the limit force is reached because some part of

the holding element supporting the contact glass is against the lower stop as recited in amended claim 23. Accordingly, Applicant takes the position that the stop recited in amended claim 26 is already depicted in the drawings at least in Figs 9 as described with relation to Fig. 12.

Reference to Fig. 10 and paragraph 0077 which describes Fig. 10 discloses that "The arm 24 or the support 26, respectively, contacts the extension 6 at a support not illustrated." Reference to Fig. 10 reproduced below clearly depicts a structure in which downward movement of arm 24 or the support 26 will lead to contact with depicted housing B in which case housing B will act as a stop to prevent further downward motion of arm 24 and the support 26 thus acting as a stop as claimed in claim 26.



With regard to the objection that the holding element of claim 26 is not shown in the drawings, Applicant respectfully traverses the rejection. Contact glass 23 is depicted for example in Figs. 4-7 as well as Figs. 8 and 10. In the depicted example embodiments, contact glass 23 is coupled to nozzle 10 and supported by arm 24 and support 26 depicted in these figures. Accordingly, the example "holding element" represented by these structures is already depicted in the figures. Note that claim 27 recites that "the holding element further comprises focusing optics, which focus the treatment laser beam into or onto the eye." The focusing optics

are depicted, for example, in Figs. 4-7 as part of the holding element (arm 24 and support 26). Applicant respectfully traverses the rejection and respectfully requests that the Examiner withdraw the objection.

35 U.S.C. § 112

The Office Action rejected claims 26 and 27 under 35 U.S.C. § 112, second paragraph as being indefinite. In particular, the Office Action indicated a lack of antecedent basis for the limitations of “the housing” in line 2 of claim 26. By this Amendment, Applicant has provided antecedent basis for “the housing.” Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection.

Claim Rejections – 35 U.S.C. § 102

The Office Action rejected claims 23-28 under 35 U.S.C. § 102(b) as being anticipated by Hsueh et al. (U.S. Patent 5,336,215).

By this Amendment, Applicant has amended claim 1 to recite the limitations:

and further wherein the safety mechanism comprises a stop provided in the housing and a holding element to which the contact glass is mounted, wherein the holding element is pressed against the stop in the direction of incidence of the laser beam by a force defining the limit value of force.

Similar limitations were previously recited in claim 26. Applicant respectfully traverses the rejection, in particular, with the regard to the rejection of claim 26. The Office Action indicates that Hsueh discloses that the contact glass (identified as Reference Numeral 54 in Fig. 2) is mounted to a holding element (identified as Frame 30 in Fig. 2), which is pressed against a stop of the housing (identified as Base 28) with a force defining the limit value of force. Referring to Col. 4, lines 32-55. Applicant respectfully traverses the rejection.

The claimed invention relates to a laser treatment device for ophthalmic surgery. The laser treatment device employs a contact glass which is placed onto the cornea of an eye of the patient. The contact glass serves to fixate the eye with respect to the laser treatment apparatus as well as to direct the laser treatment beam under well defined optical conditions when the treatment beam is applied to the eye. The invention further relates to a safety mechanism in the laser treatment apparatus. Because the patient may involuntarily move the eye or head during the surgical procedure, the safety mechanism of the invention as claimed helps prevent damage to the patient's eye in the event that the patient moves the eye or head.

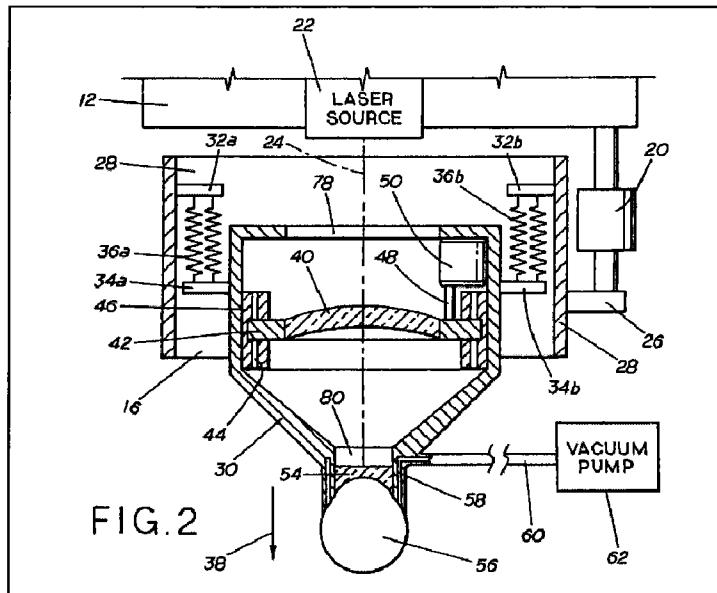
Generally, in a laser treatment apparatus, a headrest is provided against which the head of the patient rests. A contact glass is placed on the eye to establish a fixed spatial relationship between the laser treatment apparatus and the eye to which treatment is applied by laser. The laser treatment apparatus provides a substantially rigid relationship between the headrest and laser treatment apparatus itself.

To avoid damage to the eye, according to the present invention, the safety mechanism causes movement to separate the headrest and the contact glass by moving them apart when a force is directed onto the contact glass substantially in opposition to the direction of incidence of the laser beam that is above a threshold value. In other words, if a patient lifts his head from the headrest with sufficient force, the safety mechanism, in accordance with the invention, prevents an undue increase in pressure between the contact glass and the eye since the headrest and the contact glass move apart in response.

In contrast, if even small amounts of movement of the patient's head or eye resulted in a separation movement occurring between the headrest and the contact glass, normal operation of the laser to treat the eye is impaired. An undesired movement of the contact glass with respect to the laser apparatus interferes with the optical function of the contact glass that must be fulfilled to maintain the optical path of the laser treatment beam to the eye.

According to amended claim 23, and previously pending claim 26, the contact glass is mounted to a holding element and the apparatus includes a housing having a stop, the holding element is pressed against the stop by predetermined force acting in the same direction as the incidence of the laser beam. The holding element with a contact glass attached can be moved in a direction opposing this force by a force overcoming the predetermined force. Thus, the pressing force defines a limit value of force which must be exceeded to actuate a separating movement between the headrest and the contact glass.

The Office Action indicated that these limitations are anticipated by Hsueh. Applicant respectfully traverses the rejection.



Referring to Hsueh at Col. 4, lines 36-50, Hsueh recites:

A compensating device, such as a linear force spring 36a,b, interconnects the respective upper arm 32a,b to the lower arm 34a,b. Preferably, this compensating mechanism is a spring device, such as a constant force spring which generates a substantially constant force in opposition to any movement of the frame 30 relative to base 28 in the directions indicated by arrow 38. Through this compensating device, the frame 30 is suspended from base 28 and importantly, due to the linear force generated by springs 36a,b, any displacement of frame 30 from its equilibrium position will create a substantially constant opposing force. Preferably, this opposing force is in the approximate range of from zero to three hundred grams (0-300 gms).

In particular, Hsueh states that through the compensating device depicted in Fig. 2, the frame 30 that supports the contact glass is suspended from the base 28 by springs 36a and 36b.

According to Hsueh, any displacement of frame 30 from its equilibrium position will create a substantially constant opposing force and Hsueh discloses that this force will be in the range of 0-300 grams. Accordingly, with this understanding and referring to Fig. 2 reproduced above, if a force is applied to the contact glass in Hsueh, movement of the contact glass will occur. The movement of the contact glass will be opposed by force from springs 36a and 36b, but nonetheless, the contact glass and supporting structures will be moved. If the springs 36a and 36b are relatively soft or flexible, the movement will be large in magnitude. If the springs 36a and 36b are stiff or hard, there will be a small movement but movement will nevertheless occur.

In contrast to the system disclosed by Hsueh, the inventors of the present application have recognized that it is not necessary or desirable to allow free movement of the contact glass even if such movement is opposed by an opposing force such as that presented in Hsueh by springs 36a and 36b. Contrary to Hsueh, the inventors of the present application have recognized that it is better to prevent movement of the contact glass if the force applied by the eye to the contact glass is below a threshold value.

Accordingly, the contact glass in the invention as claimed in amended claim 23 is fixed in location relative to the headrest until a force exceeding a predefined limit value of force is directed onto the contact glass in a direction substantially counter to the direction of incidence of laser beam. The structures that provide this fixation of movement of the contact glass are the holding element pressed against the stop by a predetermined force. The holding element refers

the structures that support the contact glass, for example, nozzle 10, arm 24 and support 26 in one example embodiment. Because the holding element is pressed against the stop by a downward force equal to the predefined limit value of force, the contact glass and the holding element to which it is coupled remain stationary unless and until an upward directed force from the eye is applied to the contact glass and thus the holding element to which the contact glass is operably coupled, thereby overcoming the downward force against the stop.

In several example embodiments presented in the original application, the holding force is applied by the weight of arm 24 in combination with support 26, less the counter balance force that has been applied to arm 24 and support 26. The structures applying this counter balance force are depicted schematically by suspension 27 which according to paragraph 0064, is described as follows “further, a spring suspension 27 reducing the static forces is effective at the free end of the support 26. The arm 24 or the support 26, respectively, is further supported by the cantilever 6 such that it contacts the latter with a defined force. This bearing load is set by the suspension 27.”

In Figs. 6 and 7, the counter balancing force is depicted as provided by negative pressure drive 28.

The claimed invention provides several substantial advantages over the prior art.

First, the contact glass is fixed in position if a force applied to it is below the threshold force. This provides a considerable benefit when bringing the contact glass into initial contact with the cornea to be treated. When initial contact is made with the cornea to be treated, the contact occurs at the corneal apex. The fact that the contact glass is fixed allows pressure to be gradually increased starting at the corneal apex to deform the cornea slightly to conform the

corneal shape with the shape of the contact glass. This largely eliminates the entrapment of air bubbles between the cornea and the contact glass and also reduces wrinkling or distortion of the corneal tissues as the cornea is gradually formed to conform to the shape of the contact glass. This results in better surgical results because of reduced wrinkling of the cornea.

Accordingly, the device disclosed by Hsueh does not disclose or suggest all of the limitations of amended claim 23 and the device disclosed by Hsueh has significant disadvantages as compared to the claimed invention. Accordingly, Hsueh cannot anticipate or render obvious the invention as now claimed.

The Office Action also rejected claims 23, 45 and 46 under 35 U.S.C. § 102(e) as being anticipated by Loesel (U.S. Publication 2005/0192562). As discussed above, Applicant has amended claim 23 to recite the limitations

and further wherein the safety mechanism comprises a stop provided in the housing and a holding element to which the contact glass is mounted, wherein the holding element is pressed against the stop in the direction of incidence of the laser beam by a force defining the limit value of force.

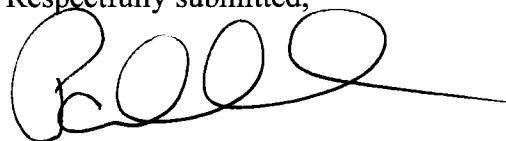
These limitations along with the other limitation recited in claim 1 are not disclosed or suggested by Loesel. Accordingly, Loesel cannot anticipate claim 23 as amended. Applicant respectfully requests that the Examiner withdraw the rejections. Claims 25, 27, 28 and 45 depend from claim 23 and should be patentable for at least the same reasons as claim 23. Rejections of these claims are traversed while not specifically argued here in view of their dependency on a patentable base claim.

In view of the foregoing, it is submitted that this application is in condition for allowance.

Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,



Paul C. Onderick
Registration No. 45354

Customer No. 24113
Patterson Thuente Christensen Pedersen, P.A.
4800 IDS Center
80 South 8th Street
Minneapolis, Minnesota 55402-2100
Telephone: 612.349.5766